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# सीधे घूर्णी जलकूप वेधन रिग के लिए गोल केली — अपेक्षाएँ

*Indian Standard*

# ROUND KELLY FOR DIRECT ROTARY WATER WELL DRILLING RIG — REQUIREMENTS

ICS 73.100.30

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

*August* 2002

**Price Group 3**

Diamond Core and Water Well Drilling Sectional Committee, ME 21

## FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Diamond Core and Water Well Drilling Sectional Committee had been approved by the Mechanical Engineering Division Council.

Indian Standard IS 11180 : 1985 'Specification for kellys for direct rotary drilling' has been prepared for square and hexagonal kelly for direct rotary water well drilling rigs. Now-a-days instead of square and hexagonal kellys, three fluted round kellys are mostly used in water well drilling rigs. Consequent to this change standard for fluted kellys has been necessitated. Accordingly an Indian Standard on round kelly for direct rotary water well drilling rigs has become a necessity. On publication of this standard, as decided by the Sectional Committee, IS 11180 : 1985 may be withdrawn as square and hexagonal kellys are not generally used now-a-days.

The composition of the Committee responsible for the formulation of this standard is given in Annex A.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values ( *revised* )'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

# *Indian Standard*

# ROUND KELLY FOR DIRECT ROTARY WATER WELL DRILLING RIG — REQUIREMENTS

## 1 SCOPE

This standard covers the technical requirements of single piece three fluted round kelly for direct rotary water well drilling rig for transmitting the rotational movement from the rotary table to the drill string.

## 2 REFERENCES

The Indian Standards listed below contain provisions, which through reference in this text constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards given below:

| *IS No.* | *Title* |
|---|---|
| 1499 : 1977 | Method of Charpy impact test ( U-notch ) for metals ( *first revision* ) |
| 1500 : 1983 | Method for Brinell hardness test for metallic materials ( *second revision* ) |
| 1608 : 1995 | Mechanical testing of metals — Tensile testing ( *second revision* ) |
| 5517 : 1993 | Steels for hardening and tempering — Specification ( *second revision* ) |

## 3 DIMENSIONS

These kellys shall be made conforming to the dimensions as given in Table 1.

## 4 MATERIAL

These kellys shall be manufactured from alloy steel seamless mechanical tubing conforming to the designation 40 Cr4 or 42Cr4Mo2 of IS 5517 or equivalent steel having the following properties after heat treatment:

| | |
|---|---|
| Yield strength | 686 N/mm$^2$, *Min* |
| Tensile strength | 882 N/mm$^2$, *Min* |
| Elongation, percent | 11, *Min* |
| Impact strength ( Longitudinal ) | 35 J |
| Hardness | 255 BHN, *Min* |

## 5 GENERAL REQUIREMENTS

**5.1** The outside surface of the kelly shall be sound, free from cracks, slivers, laminations, inclusions or other visible defects that may affect the quality and strength of kelly.

**5.2** Three flutes to be milled on the kelly as specified in the figure or as per the purchase order.

### 5.3 Heat Treatment

Kelly shall be heat treated in full length to achieve the specified hardness as given in **4** by hardening and tempering.

### 5.4 Straightness

**5.4.1** The total length deflection of kelly shall not exceed 1 mm per 2 000 mm length of kelly.

**5.4.2** *Thread Connections*

Kellys shall be furnished with rotary shouldered connection in the sizes and style as shown in the figure or as specified in the purchase order.

**5.4.3** Thread gauging and inspection shall be done as agreed to between the purchaser and the manufacturer till a standard on shouldered connections covering these requirements is published.

**5.4.4** Thread portion of the kelly shall be phosphated to prevent corrosion and galling.

**5.4.5** *Dimensions of the Thread*

Dimensions of threads of kelly shall conform to Tables 2 and 3. All shouldered contact faces shall be square with thread axis and flat within 0.05 mm.

**5.4.5.1** *Tolerances*

The following tolerances shall apply to lead and taper of rotary shouldered connections of kelly:

Lead tolerance : ± 0.04 mm/mm

Total thread length : ± 0.11 mm or the sum of 0.025 mm for each mm within total thread length whichever is greater

The tolerance per millimetre is the maximum allowable error for any millimetre within total thread length. The total thread length is the length between the first and last complete thread.

**5.4.5.2** *Taper tolerances*

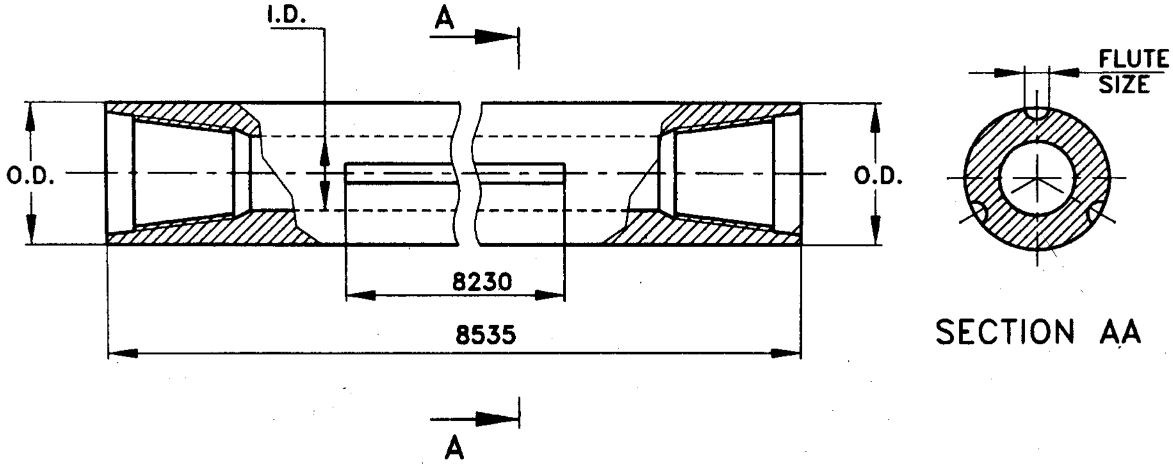
Pin thread : $^{+0.76}_{-0.00}$ mm

Box thread : $^{+0.00}_{-0.76}$ mm

## Table 1 Dimensions of Kelly

( *Clause* 3 )

All dimensions in millimetres.



| O. D.<br>+ 0.08<br>– 0.00<br>(1) | I. D.<br>+ 0.16<br>– 0. 00<br>(2) | Flute Size, *A*<br>+ 0.08<br>– 0.00<br>(3) | Upper Connection<br>(4) | Lower Connection<br>(5) | Total Length<br>+127<br>– 0<br>(6) |
|---|---|---|---|---|---|
| 73.025 | 38.1 | 19.05 | NC-23<br>L.H. Box | NC-23<br>R.H. Box | 410 |
| 85.725 | 44.45 | 25.4 | 60.325 I.F<br>L.H. Box<br>(NC-26) | 60.325 L.F<br>R.H. Box<br>(NC-26) | 410 |
| 117.475 | 57.15 | 31.75 | 38.9 I.F.<br>L.H. Box<br>(NC-38) | 38.9 I.F<br>R.H. Box<br>(NC-38) | 410 |

NOTES

1 Kelly shall be heat treated to 255 BHN, *Min.*

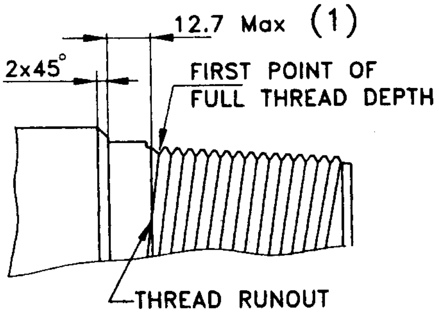
2 Thread shall be as per Table 1.

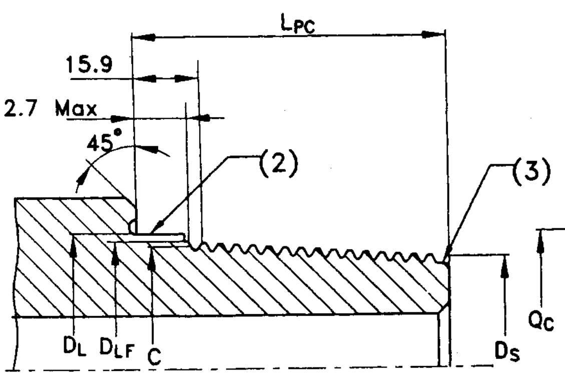
3 Thread profile shall be as per Table 2.

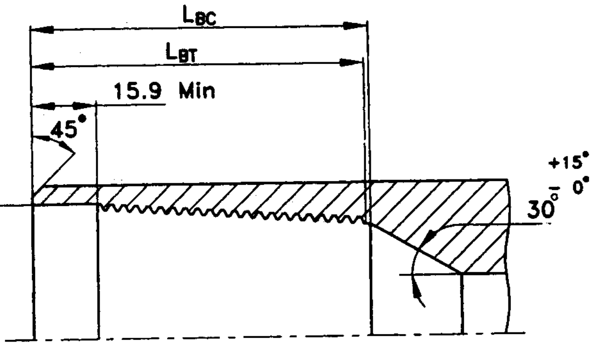
## Table 2 Dimensions of Rotary Shouldered Connections

( *Clause* 5.4.5 )

All dimensions in millimetres.







For drill bits only, the allowable bevel angle is 45° to 70°.

(1) The distance between the pin shoulder and the intersection of the pin base diameter with the thread flank at the first point of full thread depth cannot exceed 12.7 mm.

(2) This detail standard for drill collars optional with manufacturer for all other drill stem elements ( dimension $D_{LF}$ and 1.59 ± 0.38 mm radius of pin base ).

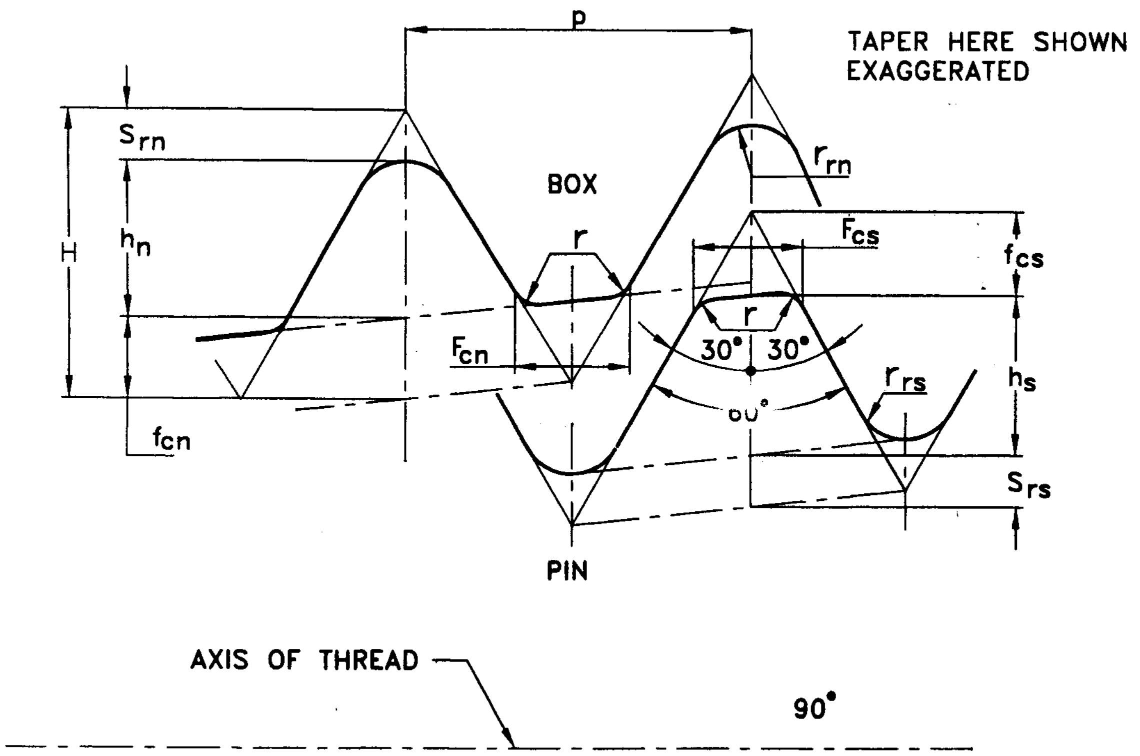
(3) Extent of bevel on pin and box starting thread is optional with manufacturer.

| Connection Number or Size (1) | Thread Form (2) | Thread Pitch (3) | Taper mm per mm as Diameter (4) | Pitch Diameter of Gauge Point $C$ (5) | Large Diameter at Pin $D_L$ (6) | Diameter of Flat on Pin ± 0.40 $D_{LF}$ (7) | Small Diameter of Pin $D_S$ (8) | Length of Pin + 0.00 − 3.75 $L_{PC}$ (9) | Minimum Thread Length $L_{BT}$ (10) | Depth of Box +0.79 − 0.00 $L_{BC}$ (11) | Box Counter Bore + 0.79 − 0.40 $Q_C$ (12) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| NC-23 | V-0.038R | 6.35 | 0.167 | 59.817 | 65.100 | 61.900 | 52.400 | 76.2 | 79.4 | 92.08 | 66.68 |
| NC-26 | V-0.038R | 6.35 | 0.167 | 67.767 | 73.050 | 69.850 | 60.350 | 76.2 | 79.4 | 92.08 | 74.61 |
| NC-35 | V-0.038R | 6.35 | 0.167 | 89.687 | 94.971 | 90.075 | 79.096 | 96.25 | 98.4 | 111.12 | 96.84 |
| NC-38 | V-0.038R | 6.35 | 0.167 | 96.723 | 102.006 | 98.831 | 85.065 | 101.6 | 104.8 | 117.48 | 103.58 |

## Table 3 Thread Dimensions of Rotary Shouldered Connections

( *Clause* 5.4.5 )

All dimensions in millimetres.



| Thread Form | Taper mm/mm | Reference Thread Height — Non-Truncated $H$ | Reference Thread Height — Truncated $h_n = h_s$ | Reference Root Truncation $S_{rn} = S_{rs}$ $f_{rn} = f_{rs}$ | Reference Crest Truncation $f_{cn} = f_{cs}$ | Width of Flat | | Root Radius $r_{rn} = r_{rs}$ | Radius at Thread Corners Form $r$ ± 0.203 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Crest $F_{cn} = F_{cs}$ | Root $F_{rn} = F_{rs}$ | | |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| V-0.038R | 0.167 | 5.487 | 3.095 | 0.965 | 1.426 | 1.651 | — | 0.965 | 0.381 |
| V-0.038R | 0.25 | 5.471 | 3.083 | 0.965 | 1.422 | 1.551 | — | 0.965 | 0.331 |

## 6 TESTS

### 6.1 Dimensional Test

**6.1.1** Total deflection in kellys shall be verified with a metallic ruler/ straight edge.

**6.1.2** Total length deflection shall be verified by placing both ends on two level supports and measuring the deflection of a side face. The kelly shall then be turned through 90° and deflection measured again on a side face.

**6.1.3** Gauging of bore of kelly shall be done with a drift mandrel 3 050 mm long having minimum diameter equal to the nominal bore '*d*' minus 3.2 mm.

### 6.2 Mechanical Test

**6.2.1** An additional length of 120 mm shall be left at the lower end of the kelly. This additional portion shall be cut off after heat treatment of kelly in order to prepare test specimen for tests as given in **6.2.2** to **6.2.5**.

**6.2.2** *Tensile Test*

Tensile test shall be carried out in accordance with IS 1608.

**6.2.3** *Impact Test*

This longitudinal impact test shall be carried out in accordance with IS 1499 on a specimen taken from one sample from a lot of 10 kellys.

**6.2.4** *Hardness Test*

Hardness test shall be carried out in accordance with IS 1500. Five readings shall be made, one at each end and the other three along the length of the kelly at equal spacing.

**6.2.5** *Retest*

If a sample is rejected on inspection, all tests shall be repeated on two samples taken from the same lot. If both the samples fail, each kelly shall be tested.

## 7 MARKING

Each kelly shall be die stamped with the following details:

a) on the upper side, the mark of manufacturer and the size and style of connection, and

b) on the lower side, the size and style of connection.

## 8 PACKING

**8.1** The thread of kelly shall be covered with anti-corrosive lubricant to protect the thread from damage under climatic conditions as specified by the purchaser.

**8.2** The kelly shall be provided with thread protectors.

# ANNEX A

## ( *Foreword* )

## COMMITTEE COMPOSITION

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